Claims

1. Method for adapting detection of a measuring signal of a waste gas probe. (41), which is disposed in an internal combustion engine comprising a plurality of cylinders (Z1 to Z4) and assigned injection valves (34) which deliver the fuel to the cylinders (Z1 to Z4), with the waste gas probe (41) being arranged in a waste gas tract and its measuring signal being characteristic for the air/fuel ratio in the respective cylinder, in which

- for a predefined crankshaft angle (CRK_SAMP) in relation to a reference position of the piston (24) of the respective cylinder (Z1 to Z4) the measuring signal is detected and is assigned to the respective cylinder (Z1 to Z4),
- by means of a controller an adjustable variable is generated for influencing the air/fuel ratio in the respective cylinder (Z1 to Z4) depending on the measuring signal detected for the respective cylinder (Z1 to Z4) and
- the predefined crankshaft angle (CRK_SAMP) is adapted as a function of an instability criterion of the controller.

2. Method as claimed in claim 1, in which the instability criterion depends on the manipulated variable or variables of the controller assigned to the respective cylinder (Z1 to Z4) and/or further controllers which are assigned to the other cylinders (Z1 to Z4).

3. Method as claimed in claim 2, in which the instability criterion is fulfilled if the manipulated variable or manipulated variables respectively is or are equal to their maximum value (MAXV2) to which it is or they are limited by the controller,

or is equal or are equal to the minimum value (MINV2) to which it is or they are limited by the controller.

4. Method as claimed in claim 2, in which, to fulfill the instability criterion, it is necessary for all manipulated variables to be equal for the predefined period to their maximum value (MAXV2) to which they are limited by the controller or to be equal to their minimum value (MINV2) to which they are limited by the controller and for this to apply to the manipulated variables of all cylinders.

5. Method as claimed in claim 4, in which, to fulfill the instability criterion, it is necessary that for an even number of cylinders (Z1 to Z4) the one half of the manipulated variables is equal to the maximum value (MAXV2) and the other half is equal to the minimum value (MINV2) and that for an odd number of cylinders (Z1 to Z4) a first number of manipulated variables is equal to the maximum value (MAXV2) and a second number of manipulated variables is equal to the minimum value (MINV2), with a first number differing by one from the second number and the sum of the first and the second number being equal to the odd number of cylinders.

6. Method as claimed in one of the claims 4 or 5, in which, on an error (ERR) of the injection valve (34) or of an actuating element, it is detected that explicitly the air feed to the respective cylinder (Z1 to Z4) is influenced if the manipulated variable of the respected cylinder (Z1 to Z4) is equal for a predefined period to its maximum value (MAXV2), to which it is limited by the controller or is equal to its minimum value (MINV2), to which it is limited by the controller and at least one manipulated variable which is assigned to another

cylinder (Z1 to Z4) is not equal to the maximum value (MAXV2) or the minimum value (MINV2).

7. Method as claimed in one of the claims 2 to 6, in which the instability criterion is fulfilled if at least the manipulated variable assigned to one cylinder (Z1 to Z4) oscillates at an amplitude (AMP) which is greater than the predefined amplitude threshold (AMP_THR).

8. Method as claimed in claim 1, in which the controller comprises a monitor which determines a status variable depending on the measuring signal of the waste gas probe (41) detected. with a variable of the monitor characterizing the status variable being coupled back and for which the instability criterion depends on one or more of the status variables.

9. Method as claimed in claim 8, in which the instability criterion is fulfilled if the status variable or the status variables respectively, for a predefined time, is or are equal to their maximum value (MAXV1) to which it is or they are limited by the controller, or is or are equal to their minimum value (MINV1), to which it is or they are limited by the controller.

10. Method as claimed in claim 8, in which, up to fulfill the instability criterion, it is required that all status variables are equal for the predefined period to their maximum value (MAXV1) to which they are limited by the controller or are equal to their minimum value (MINV1) to which they are limited by the controller and that this applies to the status variables of all cylinders.

11. Method in accordance a with claim 10 in which, to fulfill the instability criterion, it is required that with an even number of cylinders (Z1 to Z4), the one half of the status variables are equal to a maximum value (MAXV1) and the other half are equal to the minimum value (MINV1), and that with an odd number of cylinders (Z1 to Z4) a first number of status variables are equal to the maximum value (MAXV1) and a second number of status variables are equal to the minimum value (MINV1), with the first number differing from the second number by one and the sum of the first and the second number being equal to the odd number of cylinders.

12. Method as claimed in one of the claims 10 or 11, in which, on an error (ERR) of the injection valve (34) or of an actuating element, it is detected that exclusively the air feed to the respective cylinder (Z1 to Z10) is influenced if the status variable of the respective cylinder (Z1 to Z4) is equal for a predefined period to its maximum value (MAXV1), to which it is limited by the controller or is equal to its minimum value (MINV1), to which it is limited by the controller and at least one manipulated variable which is assigned to another cylinder (Z1 to Z4) is not equal to the maximum value (MAXV1) or the minimum value (MINV1).

13. Method as claimed in one of the claims 8 to 12, in which the instability criterion is fulfilled if at least the status variable assigned to one cylinder (Z1 to Z4) oscillates at an amplitude (AMP) which is greater than a predefined amplitude threshold (AMP_THR).

14. Method as claimed in one of the previous claims, in which the predefined crankshaft angle (CRK_SAMP) is adapted using an

increment which corresponds to a predefined fraction of the expected stability range.

15. Method as claimed in claim 14, in which the fraction corresponds to around 1/5 of the expected stability range.

16. Method as claimed in one of the previous claims, in which the measuring signal of the waste gas probe(41) is characteristic for the air/fuel ratio in the respective cylinder (Z1-Z4) of a first part of all cylinders (Z1-Z4) and in which a further waste gas probe is provided, of which the measuring signal is characteristic for the air/fuel ratio in the respective cylinder (Z1-Z4) of a second part of all cylinders (Z1-Z4) and in which the detection of the measuring signal of the waste gas probe (41) and of the further waste gas probe are then adapted separately and related in each case to the part and the second part of all cylinders (Z1-Z4).